Table of Contents

Advances in Gene and Cell Therapy

Description: Gene and Cell Therapy are relatively new and exciting fields of research that aim to treat inherited and acquired diseases. Gene therapy requires the use of genetic material to treat a disorder, while cell therapy uses whole cells. Blood transfusions and bone marrow transplants are two well-known methods of cell therapy. In this journal club we will discuss the classic examples of gene and cell therapy and study some of the advances in the field, like T-cell treatment of leukemia and Factor XIII replacement in hemophilia. Members will learn about methods and protocols for gene and cell therapy as well as how to critically evaluate scientific publications.

Co-leaders: Jeanelle Spencer PhD, NCI; and Tania Felizardo PhD, NCI

Dates/Time/Location: Wednesdays (June 26th, July 3rd, 17th, 24th, and 31st); 12 -1pm; Building 10 CRC 4E-3330

Directions: From the north entrance of Bldg. 10- Walk to the central elevators behind the information desk. Take the elevators to the 4th floor. Walk through the corridor to the East Research Labs. The conference room will be on the right.

Advances In Physical Activity Epidemiology: Understanding The Challenges Of Monitoring And The Methods Associated With This Complex Health Behavior.

Description: Physical activity, bodily movement produced by the contraction of skeletal muscle that substantially increases energy expenditure, is a complex health behavior. It is an outcome of the interactions among: personal attributes (demographics, biomedical, psychological), characteristics of the behavior (skill requirements for the activity), and environmental factors (physical environment, social environment, culture, time constraints). Fundamental human movements may exert specific metabolic, cardiorespiratory, hormonal, psychological, or musculo-skeletal effects which are not well characterized. This journal club will explore some of the challenges, changes, and limitations of how researcher's measure physical activity as an exposure and health outcomes associated with physical activity. Members will learn that while physical activity is often limited to: a behavior that can be self-reported, or a movement that can be measured by an objective device and classified into light, moderate or vigorous; some measurement tools that are more optimal than others. We will also discuss how to make an informed decision when choosing a monitoring tools and methods in physical activity research.

Co-leaders: Jeremy Steeves, PhD, MPH, NCI; and Britni Belcher, PhD, MPH, NCI

Dates/Time/Location: Thursdays (July 11th, 18th, 25th, and August 1st); 1-2 pm; Building 10 CRC, Conference Room on the Metabolic Unit 5 SWN

Bio-Molecules In A Crowding World

Description: Biochemical reactions in living cells take place in media in which all species of bio-molecules taken together occupy a significant fraction of the fluid volume, instead of a simple diluted buffer system in which most of the current experiments carried out. Behaviors of large macromolecules or macromolecular assemblies in a cell would be expected to be greatly affected by the presence of high concentrations of co-solutes. The ubiquity of this phenomenon in biological fluids has been compared to that of gravity. This journal club will cover publications on the definition of crowding effect, the experiment results affected by crowding effect, and variety of biochemical phenomenon caused by crowding effect. Members will understand the importance of crowding effect and learn about methods and protocols accounting for the crowding problems as well as how to critically evaluate scientific publications.

Co-leaders: Di Wu, PhD, NIDDK; Xiao-Nan Zhao, PhD, NIDDK

Dates/Time/Location: Thursdays (June 27th, July 11th, 18th, 25th); 2-3 pm; Building 8, Room 122

Breaking Barriers: Mechanisms of Cancer Cell Invasion and Metastasis

Description: The progression of cancer from a benign growth to malignant disease is a multistep process involving several signaling pathways. This journal club will review publications that investigate key processes activated during the metastatic process including changes in adhesion, gain of motility, gain of invasion potential, activation of survival mechanisms, and angiogenesis. Members will learn about the laboratory methods used to study these important processes and how to read, evaluate and present scientific articles.

Co-leaders: Carrie House, PhD, NCI; Ngoc-Han Ha, PhD, NCI

Dates/Time/Location: Monday (June 24th, July 8th, 15th, 22nd, and 29th); 12-1 pm. Building 10, Room 5-2550. Note: There will NOT be a meeting July 1.

Cancer Immunotherapies

Description: The immune system has evolved to help protect us from infectious diseases such as bacteria and viruses. Interestingly, our immune systems also play a role in protecting us from developing cancer. Scientists have recently begun to harness the power of the immune system to successfully develop new cancer treatments. In this journal club, we will discuss the science behind “Cancer Immunotherapy” and learn how we can manipulate the immune system to fight cancer. Topics such as basic immunology, the role of the immune system during cancer development, and how we can genetically engineer immune cells to target cancer, will be covered.

Co-leaders: Amber Giles, Meera Murgai, and Adrienne Long

Dates: Tuesday, (July 2nd, 9th, 16th, 23rd, and 30th); 2-3pm; Building 10, Room 2W-3961.

Directions: From the clinical/North entrance, walk to the West wing. Walk to the end of the wing (pass through three doors) and take the elevator up to the 2nd floor. Stairs are also located around the side of the elevator. We will post signs to help guide Interns to the room for the first meeting.

Cancer on Drugs

Description: We are at war with cancer. How can we, as scientists, come out on top and win this war? By discovering agents that will stop the cancer dead in its tracks and ultimately lead to its mass destruction. In this journal club students will discuss and investigate the cancer drug discovery process from molecular targeting to preclinical development to clinical trial. Each session will focus on one paper detailing an important stage of the discovery process. Students will be expected to read the week's publication ahead of time and actively participate in group discussions. At the end we will help the students identify where their career goals fit into the process of drug discovery.

Co-leaders: Thomas Prince, PhD, NCI; Young Lee PhD, NCI; and Bethanie Morrison PhD, NCI

Dates/Time/Location: Fridays (July 12th, 19th, 26th, August 2nd); 11 am - 12 (noon); Hatfield Center (Building 10), Conference Room 3-2550

Directions: Conference room 3-2550 is in the north central part of the Hatfield Center, which is the north half of Building 10. From the 1st floor of the North lobby of the Hatfield Center, take either set of north elevators to the 3rd floor. The room is in between the two north elevators and directly across from 3 Clinical Director's suites.

Cellular Biology of Aging

Description: All living things undergo the process of aging. As an organism ages, many changes occur at the cellular and molecular level that lead to a deterioration in the organism's health and fitness. In humans, a broad range of diseases are associated with aging including cancer, Alzheimer's disease, arthritis, diabetes and heart disease. In addition to the various diseases caused by the normal aging process, there are inherited syndromes that cause premature aging, where aging is accelerated and life expectancy is severely reduced. While the genetic causes of premature aging syndromes have been identified, much is still unknown about the biology of both premature aging and aging in normal individuals. A wide range of model organisms are used to study the process of aging and the diseases of old age. In this journal club we will discuss research papers that utilize a variety of experimental approaches to try to understand the cell biology of aging.

Co-leaders: Rebecca Meseroll PhD, NIDDK; and Alison Walters PhD, NIDDK

Dates/Time/Location: Tuesdays (June 25th, July 9th, 16th, and 23rd); 2-3 pm ; Building 8, Room 302

Directions: Take the elevator to the 3rd floor and turn left. Room 302 is the last room on the left side of the corridor.

Closing the Gap: A Closer Look at Health Disparities in America

Description: Health disparities (HD) are differences between specific population groups regarding the incidence, prevalence, mortality and burden of disease and other adverse health conditions. Despite ongoing efforts to reduce health disparities in the US, racial and ethnic minority populations still experience a higher incidence of chronic diseases, higher mortality and morbidity, and poorer health outcomes when compared to non-minorities. More than one third of adults in the US are obese, increasing their risk of suffering heart disease, hypertension and diabetes. This interactive journal club will provide you with an introduction and background into HD and obesity and obesity-related diseases in minority groups (i.e. African American). Participants will engage in interactive discussions of journal articles based on this particular HD topic.

Co-Leaders: Natasha Lugo-Escobar, PhD; Shauna Clark, PhD; and Yewon Cheon, PhD

Dates/Time/Location: Thursdays (July 11th, 18th, 25th and August 1st); 4-5 pm; Location Building 2, Conference Room 2W15

Degradation in Disease

Description: During the life-cycle of a cell, a considerable amount of cellular waste builds up and must be efficiently cleared and recycled. Many diseases, including cancer, neurodegenerative disorders, infection, and digestive disorders can be attributed to defects in cellular degradation pathways. This journal club will explore how the major intracellular degradation pathways, the ubiquitin proteasome system, and the autophagy-lysosome pathway, can contribute to disease development and be manipulated to treat disease.

Co-leaders: Danielle Sliter, PhD; and Adam Fogel, PhD

Dates/Time/Location: Tuesdays (June 25th, July 2nd, 9th, 16th, 23rd, and 30th); 10-11am; Building 35 Room 3BC-900

Diagnostic Imaging: How Close Are We To Replacing Radiologists With Machines?

Description: With invention of new medical imaging techniques and state-of-the-art reliable algorithms for organ segmentation, quantification and diagnosis; the need for human assistance is fast diminishing; but are we on our way to completely replace radiologists? Specifically, this journal club will discuss the algorithms and applications of the current state-of-the-art CAD systems for multiple imaging modalities (CT, MR, PET as well as PET-CT and MRI-PET) with much of the focus on the automated analysis of organs and pathologies, such as infectious disease inflammation as well as cancerous tumors. And how close are we to fully computerized radiologists?

Co-leaders: Awais Mansoor, PhD; Ziyue Xu, PhD; Brent Foster, BS

Dates/Time/Location: Tuesdays (July 9th, 16th, 23rd, 30th); 4 -5 pm; Building 10, 1C331

Eating Behavior In The Modern World: Problems, Consequences And (Possible) Solutions

Description: The aim of this journal club is to gain a better understanding of why we eat what we eat, how our genetic makeup, predispositions and environment influence the food choices we make, and how our eating behavior influences physical and psychological health outcomes. If energy intake consistently exceeds energy expenditure, overweight and obesity are inevitable consequences. People with excess body weight may suffer from a number of eating-related diseases, social stigma and low self-esteem. Furthermore, our food choices may also have potential consequences on others, such as on our offspring. Some weight loss interventions could offer a promising solution. Members will learn about the determinants and consequences of problematic eating, will explore methods to promote adaptive eating behavior and will learn how to critically evaluate scientific publications.

Co-Leaders: Sofia Bouhlal, PhD; Dina Eliezer, PhD; and Eszter Szekely, PhD, NHGRI/SBRB

Dates/Time/Location: Wednesdays (June 26th, July 3rd, 10th, and 17th); 9:30 - 10:30 am; Building 31 Room B1E12/14

Directions: The journal Club will be held on the B1 level of Bldg. 31. You'll note, there are A, B and C wings to the building. When you enter through the A wing, immediately turn to your right and take the elevators down one floor to the B1 level. When you emerge from the elevators, turn towards the "Self Service Store" and go down the hallway that the Self Service Store is in. You will find Room E12/14 on your right, before the double doors. The Journal Club is held in room E12/14. Knock on the door if it is locked and somebody inside the room will open it for you. It would be great if you arrive by 9:20am.

Emerging Technologies And Modern Discoveries That Pave The Way For Treatments Of Neurological Disorders And Traumas In The 21st Century

Description: The brain's complex nature can be seen, at its highest potential, through our personalities and the changes that we go through throughout our lives. On the downside, neurological disorders and nervous system traumas claim the lives and personalities of millions each year. Among some of the better known ones for which modern medicines and techniques are available, include Alzheimer's and Parkinson's Diseases; yet, neither of them can be cured and researchers are still hoping to find or develop methods to better understand and diagnose them and hundreds of others. While it is clear that we are still far away from fully understanding how our brains work, recent major technological advances in areas such as optogenetics, microfluidics, tissue engineering and deep brain recording and stimulation, in combination with the development of novel molecular probes are paving the way for scientists to finally unravel the mysteries of the brain. This journal club will cover topics ranging from axon guidance, synaptic specificity and circuit establishment, to the modern day tools and techniques that are being used to study these processes under healthy and diseased states. Members will learn about methods and protocols behind the uses and

implementation of many of these techniques in the field of neuroscience, as well as how to critically evaluate scientific literature.

Co-leaders: Oleg Milberg, NIDCR; Lyudmila Kotlyanskaya, NINDS

Dates/Time/Location: Wednesdays; (July 3rd, 10th, 17th, 24th, 31st); 10:30 - 11:30 am; Building 30, Room 318 (3rd floor conference room).

Environment Matters: How A Good Neighborhood Can Go Bad In Cancer

Description: While the frequently discussed elements of cancer are the cellular drivers of the cancer cell, increasingly there is awareness of the contribution of the non-malignant elements in the cancer mileu. It is the goal of this journal club to discuss active areas of research working towards elucidating the different elements of the cancer microenvironment that contribute to disease initiation and progression. The particular topics to be covered in this journal club will include readings and discussions relating to the contributions of: fibroblasts, inflammatory mediators/cells and extracellular matrix to the cancer phenotype

Co-leaders: Adele Blackler PhD, LP, NCI; Avi Z Rosenberg MD, PhD, LP, NCI

Dates/Time/Location: Thursdays, (June 27th, Jul 11th, 18th, 25th, Aug 1st); 12:00 – 1:00 pm; Building 10, B1C119 Conference Room

Directions: From the elevator lobby next to Masur auditorium go down to B1 level, continue down the N corridor towards 1N100. The corridor will turn into an elevator bank. At the elevator bank go past the vending machines to the left and around the corner. B1-C119 is at the end of the hallway, below Lipsett Theater.

Epigenetics and Cancer

Description: Epigenetics is an exciting and rapidly developing field that is defined as gene expression changes not due to alterations in the DNA sequence but rather mediated by a chromatin-based mechanism. Chromatin, the macromolecular complex of DNA and histone proteins, is the basic architecture that packages our entire genome. While cancer is known as a disease of aberrant genomic changes, there is growing evidence that epigenetics is of vital importance to understanding the molecular mechanisms of cancer. In this journal club, we will explore the multiple roles that epigenetics play in the development and progression of specific cancers. We will focus on recent publications that examine various types of epigenetic regulation (i.e. histone modifications, chromatin remodeling and non-coding RNAs) and how that regulation is altered in cancer. Lastly, we will delve into how discovery of certain epigenetic players have become potential targets for treatment of certain cancers.

Co-Leaders: Wenqi Ran, PhD, NLM/NCBI; Jiyeon Choi, PhD, NCI; Tara Burke, PhD, NICHD

Dates/Time/Location: Thursdays (June 27th, July 11th, 18th, 25th, and August 1st); 4-5:30pm; Building 38A Room 5N506.

First Revolution Of Neuroscience In 21st Century: Controlling The Brain With Lights

Description: Optogenetics is a neuromodulation technique applyed in behavioral neuroscience that controls the activity of individual neurons from living tissue to freely-moving animals by introducing light-activated ion channels. It is the first strategy enable human to control brain activity and behaviors precisely with both high spatial and temporal resolutions. In this journal club we will discuss how the scientists developed optogenetic technique; how optogenetics have been helped us during exploration the brain function and the prospect to use it in psychotic diseases treatment.

Co-leaders: Shuxi Liu, PhD, NINDS; Jiansong Sheng PhD, NINDS; and Marc Lussier, PhD, NINDS

Dates/Time/Location: Fridays (June 28th, July 5th, 12th, 19th); 3:00-4:00 pm; Building 35 (Porter Neuroscience Research Center) 2CD900

Directions: The conference room 2CD900 is on the 2nd floor of building 35 facing south (the parking garage). Get into building 35 from the main entrance on Lincoln Drive. Take the elevators on the right side of the hall way to floor 2R. Go straightforward to the kitchen of pod C, and the conference room 2CD900 is on the left side.

FREDRICK: Molecular and Cellular Regulation of Health and Disease

Description: In this journal club, up to two papers will be presented by students each week, allowing 30 minutes per paper with some extra time for discussion. The papers will be selected based on the research interest of the labs that the students are working in. Students will pick papers and prepare presentations. Postdoctoral discussion leaders will provide assistance and facilitate discussion. We have postdoctoral fellows with expertise in a wide variety of fields, including cancer research, immunology, stem cell biology, metabolism, and therapeutics, who have volunteered to help.

Co-leaders: Balamurugan Kuppusamy PhD, NCI; and Sameer Issaq PhD, NCI

Dates/Time: Wednesdays (June 26th, July 3th, 10th, 17th, 24th, 31st, and August 7th); 2-3:30 pm;

Location: Frederick, MD campus, Building 549: Conference Room A (on June 26th, July 10th, July 24th, July 31st); Conference Room B (on July 3rd, and August 7th); and Executive Boardroom (on July 17th)

From Antibodies To Zebra Fish: New Information From Fluorescence Microscopy.

Description: Fluorescence is a popular technique in the biological sciences; it has been widely used everywhere from the labeling of antibodies for co-localization inside cells to more 'systems biology' approaches of tagging molecules in tissue. This journal club will cover publications that explain novel applications in fluorescence microscopy including: different methodologies in super-resolution microscopy, two-photon excitation microscopy to go deep into tissue and single molecule techniques. Members will learn about these methods; however, the approach taken by the authors and the potential biological significance of the results will be emphasized.

Co-leaders: Tilman Rosales, PhD, NHLBI; Michael Brenner, PhD, NHLBI

Dates/Time/Location: Thursdays (June 27th, July 11rd, 18th, 25th); 11 am- 12 noon; Building 50, Room 3328

From Obesity To Cancer – Exploring Hot Topics And Cutting Edge Methodologies In Endocrine Research.

Description: The study of the endocrine system has undergone a dramatic evolution in the last two decades, from traditional physiologic studies that dominated the field for many years to the inception of molecular endocrinology and endocrine genetics. This journal club will cover interesting and exciting new research on a variety of key endocrine related fields including obesity, endocrine tumors and rare endocrine diseases. Members will learn about the use of various genetically engineered mice, as well as zebrafish, once used primarily by developmental biologists, now acquired by cancer biologists, and other approaches in translational research. Bring along your morning coffee/tea to discuss some of the exciting and somewhat quirky side of endocrine research.

Co-leaders: Eva Szarek PhD, NICHD; Edra London PhD, NICHD

Dates/Time: Tuesdays or Thursdays (Tue June 25th, Tue July 2nd, Thurs July 11th, Tue July 16th, Thurs July 25th, and Tue July 30th); 10-11 am.

Location: Building 10, Room 4-3330 Hatfield Clinical Center (on Tuesday meetings) and Building 10 Room 6 – B1C208 FAES (on Thursday Meetings)

Directions:

Hatfield Clinical Center - Room 4-3330:

From the Main Lobby of the CRC, go down the left corridor past the Coffee Shop. (Do not take the Central Elevators.) Look for the "1 East Corridor" sign on your left and take that door to the end of the hallway. Once there, take the "Southeast Elevators" up to the fourth floor. Conference room 4-3330 is located behind the glass, adjacent to the fourth floor elevator lobby.

FAES Classrooms - Room 6 - B1C208:

From the Masur Auditorium, go north, past the Central Elevators. Look for a bookstore/coffee shop on your right and a sign from the ceiling saying "FAES Academic Center." Take a right down the hallway, through the double-door; then take the steps down to the lower level. Rooms 1-4 are on your right and Rooms 5-8 are on your left.

Genetics of Neuromuscular Disorders

Description: In this journal club we will explore current diagnostic and therapeutic tools for use in neuromuscular disorders, including muscular dystrophies and disorders affecting motor and sensory neurons. Collectively, these rare diseases are frequent, but still the genetic cause of a large number of them remains unknown, and for all of them, few therapeutic strategies have been translated into clinical practice. Currently there is no cure for any of them. The papers chosen will cover applications in use in the field, such as exome sequencing, induced pluripotent stem cells, and gene-based therapies.

Co-leaders: Veronique Bolduc, PhD, NINDS; Kristen Zukosky, NINDS

Dates/Time/Location: Thursdays (July 11th, 18th, 25th, and August 1st); 1-2 pm; Building 35 Room 2AB-1000

Genome-Wide Approaches To Studying Cancer

Description: We will how the basic techniques of genome-wide association studies are currently being applied to studying cancer. Some techniques we will look at are single nucleotide polymorphism (SNP), copy number variation (CNV), and chromatin immunoprecipitation followed by deep-sequencing (ChIP-Seq). We will discuss how these techniques and their applications are furthering the fields of cancer genetics/genomics.

Co-leaders: Jacqueline Barlow, NCI; Robert Faryabi, NCI

Dates/Time/Location: Wednesdays (July 10th, 17th, 24th, 31st); 12-1 pm; Building 37 Room 1109

Directions: Bldg. 37 is located next to the South Drive entrance to the Bethesda campus from Old Georgetown Road. Room 1109 is located in the northwest corner of the building on the first floor.

Host-Pathogen Interactions And Infectious Disease Immunity

Description: During an infection, there is a battle between the pathogen and the host, the result of which determines the severity of disease and clinical outcome. On one side, pathogen virulence factors aid in the replication and spread of infection, while on the other, host protective innate and adaptive immune responses aim to limit disease. Pathogens may evade, inhibit, or manipulate host responses to establish a niche. Moreover, inappropriate or exaggerated responses can exacerbate disease. This journal club will explore the interaction between medically important pathogens and the human

host. Together, we will examine a variety of literature on this topic, and members will gain experience in analyzing data from *in vitro*, animal, and clinical studies.

Co-leaders: Andrew Broadbent, DVM PhD, NIAID; Ping Chen, MD PhD, NEI

Dates/Time/Location: Thursday (June 27th (1-2pm), July 11th, July 18th, July 25th, and August 1st); 12:30-1:30 (except for June 27th, 1-2 pm); Building 10, Room 10N202 (Cogan). Note: The first meeting on June 27th will be from 1-2 pm. The rest of the meetings will take place 12:30-1:30 pm.

Directions: Room 10N202 is located on the 10th floor of Building 10. Take the main elevator, near the Masur Auditorium, to the 10th floor, and you will find the North corridor and Room 10N202.

How Cells Control Their Fate: Multidisciplinary Approaches To Investigate Cellular Development.

Description: Modern biologists utilize a wide array of cutting-edge approaches to investigate cellular form and function. In this journal club, we will take a holistic approach to study the molecular mechanisms that lead to the emergence of complex organisms while drawing from model systems as diverse as microbes and humans. We will emphasize the wide array of cutting-edge methodologies used to study early development and cellular morphogenesis, including advanced genetics, genomics, computation, live cell imaging, and molecular biology. We will examine how many of these approaches are used to explore processes as diverse as organogenesis, morphogenesis, neural differentiation, cell polarity, and cell migration. Work in these fields has deep connections to many areas of human health and disease, including ageing, cancer, neurological disorders, and cardiovascular disease. We will discuss the etiology of some of these pathologies while drawing from the primary literature.

Co-leaders: Shaad Ahmad, PhD, NHLBI; Dorothy Lerit, PhD, NHLBI; Melanie Barzik, PhD, NHLBI.

Dates/Time/Location: Thursdays (June 27th, July 11th, 18th, 25th, and August 1st); 2-3 pm; Building 50, Room 2328

Directions: From the lobby of building 50, take the main elevators (or the stairs next to the health monitoring machine) up to the 2nd floor. Room 2328 is a library located across from the restrooms, which are located to your immediate right upon exiting the elevators.

How Do We See Color? – Making Sense of It With Thyroid Hormone.

Description: For thousands of years, humankind has sought light and vision to promote growth, survival and intellectual development. Darkness and the loss of sight are among our most basic fears. Importantly, almost 30% of the sensory input to the brain originates in the retina, which is referred to as the “window to the brain”. There are two types of photoreceptors in the retina, rods and cones, which mediate dim and bright light vision,

respectively. Color vision depends on distinct populations of cone cells that facilitate responses to light in different regions of the visible spectrum. In most mammals, populations of cone cells differentially express opsin photopigments for response to short (blue) or medium and long (green and red) wavelengths of light. The human syndrome of resistance to thyroid hormone has been associated with monochromacy, color vision anomalies and reduced response to red light. Genetic analyses in model species also revealed an unexpectedly critical role for the thyroid hormone in cone photoreceptors. In this series of journal club, we will cover: 1) the accurate regulation of thyroid hormone in vivo: the receptors, transporters, deiodinases and Hypothalamic-Pituitary-Thyroid axis; 2) function of thyroid hormone receptors in cone photoreceptor development; 3) role of deiodinases in cone photoreceptor development; and 4) function of thyroid hormone in retina in the adulthood.

Co-leaders: Jeff Huang, PhD, NIDDK; Yulong Fu, PhD, NIDDK.

Dates/Time/Location: Tuesdays (July 2nd, 9th, 16th, and 23rd); 1-2 pm; Building 8, Room 8D15

Human Viruses: Scientific Advances Behind Science Daily Headlines

Description: We will discuss recent scientific breakthroughs in human virology, including articles on HIV, EV71, Dengue, Hepatitis B and flu. These viruses have a significant impact on public health, as well as our daily life. The selected papers have been published in top rated scientific journals and describe structural and functional insights, essential for drug and vaccine development. The goal is to guide the students through the paper and help them critically evaluate methods and results. The selected publications had broad impact and were highlighted in media, such as Science daily. We will also discuss the media reports, which are often helpful to understand the scientific problem in a broader context and reveal potential future applications. Students will be encouraged to evaluate and discuss how the research article was presented in the media in order to distinguish between immediate conclusions of the paper and long term research goals.

Co-leaders: Anastasia A Aksyuk; co-leader Altaira Dearborn

Dates/Times/Location: Wednesday (June 26th, July 3rd, 10th, 17th, 24th, and 31st); 2-3 pm; Building 50, Room 1327

Lipid Membrane-Protein Interactions - A Structural Insight Into Membrane Fission And Fusion

Description: We will discuss the cellular events of endo- and exocytosis, fundamental cellular processes that are involved processes as diverse as synaptic transmission, receptor-down regulation and antigen-presentation. The discussion will focus on the molecular mechanisms controlling these events. We aim to have a strong structural biology basis for these discussion and will introduce concepts such as electron microscopy, total-internal reflection microscopy, crystallization and 3D reconstruction.

Co-leaders: Anna Sundborger PhD, NIDDK, and Jeanne Morin-Leisk PhD, NIDDK

Dates/Times/Location: Thursdays (June 27th, July 11th, 25th, and Aug 1st); 4-5 pm; Building 8 1st floor library/conference room

Live Action Angry Birds: Pandemic Influenza Strains Past, Present and Future

Description: Five times over the last century a novel strain of influenza has swept the globe, replacing seasonal flu, to cause a pandemic. These new strains infect broadly because there is little pre-existing immunity in the human population, due to the drastic changes in the newly assorted flu genome. The recent 2009 “Swine Flu” pandemic resulted from a triple re-assortment of influenza genes between human, pig, and bird viruses. This re-assorted virus spread easily from human to human and infected people otherwise protected from seasonal flu through vaccination or past flu exposure. This potent combination of transmissibility and antigenic novelty caused a global health emergency and highlighted the unique features of influenza biology that make flu a perennial threat to human health. In this journal club, we will read papers highlighting several important and controversial topics in the influenza field. For instance, what is unique to influenza virus biology that allows it to mutate so rapidly? What is the difference between antigenic drift and antigenic shift? What are the key aspects of the immune response that mediate protection to flu? How does antigenic drift turn a pandemic virus into a seasonal virus? What strains are currently jumping the species barrier into humans? What are the ethical issues surrounding research into the biology of highly pathogenic influenza strains? And, is there a universal flu vaccine on the horizon?

Co-leaders: Meghan Altman, PhD, NIAID; Stephanie Cush, PhD, NIAID.

Dates/Time/Location: Thursdays (June 27th, July 11th, 18th, and August 1st); 12:30 -1:30 pm. Building 4, Conference Room 414.

Making Movies: How Immune Cells Get Together and How They Conduct Their Business

Description: Immune cells are the most dynamic cells in our body. Movement to sites of infection and patrolling the body for invaders is essential to their function of fighting pathogens. Recent advances in microscopy have enabled us to follow many different types of immune cells in live mice and watch them in real time conducting their business. These imaging techniques have given us important insights into processes such as cell-cell interactions, entering and exiting tissues via vessels, and what parameters guide efficient cell migration. In this summer journal club, we will cover the basics of how these imaging techniques are used and discuss them in the context of important biological findings they have enabled.

Co-leaders: Judith Mandl PhD, NIAID; and Caren Petrie Aronin PhD, NIAID

Dates/Time/Location: Thursday (June 27th, July 11th, 18th, 25th, Aug 1st); 3-4:30 pm; Building 4, 1st floor, Conference Room, Room 118

MicroRNAs and Human Diseases

Description: MicroRNAs were discovered two decades ago, but it is only recently that microRNAs were highlighted as key regulators of many biological functions. MicroRNAs are small single-stranded, non-coding RNAs that have found to be conserved throughout evolution. This journal club will aim to introduce the field of miRNA and miRNA research. We will discuss microRNA biogenesis, function and discuss the role microRNAs play in human diseases. Participants will learn about methodology pertaining to miRNA research and how to critically evaluate scientific publications.

Co-leaders: Christine Happel, PhD, NCI; Dhivya Ramalingam, PhD, NCI

Dates/Time/Location: Wednesdays (June 26th, July 10th, 17th, and 24th); 2-3 pm; Building 10, Conference Room 3-2550

Mouse Models Of Pathology: A Picture Speaks Volumes

Description: Mouse models are used to study a variety of disease processes; their use in cancer research has unlocked the doors to challenging questions, which cannot be answered in vitro. The pathology of cancer in mouse models is crucial in understanding the pathogenesis (or road map) of the disease process. This journal club will explore pathology in variety of mouse models of cancer including liver, brain, breast, lung, and skin. Participants will have the opportunity to learn basic organ histology along with changes that occur in the cancerous tissue sections.

Co-leaders: Joy Gary, DVM, DACVP, NCI; Tiffany Reed, DVM, DACVP, NCI

Dates/Time/Location: Tuesdays (July 2nd, July 9th, July 16th, July 23rd); 4:30-5:30 pm; Building 37, Room 3142.

Non-protein-coding RNAs and Neurodegeneration

Description: The crucial roles of various classes of regulatory non-protein-coding RNAs (ncRNAs) in normal and dysfunctional processes in the Central Nervous System are becoming increasingly evident. ncRNAs are involved in neuronal cell specification and patterning during development, as well as, in higher cognitive processes, such as structural plasticity and memory formation. In this journal club, we will introduce the concept of non-protein-coding mRNAs, discuss the molecular mechanisms by which these molecules function and the roles that ncRNAs play in neuronal function. Additionally, we will discuss two journal articles that will focus on the role of microRNAs (a class of ncRNA) in normal brain development and neurodegenerative disorders. Our aim is to give the students a jumpstart in the exciting and quickly evolving field of regulatory non-protein-coding RNAs in the brain. This journal club is designed to give a primer of the terminologies used in the field, the concepts involved, as well as, various techniques and model systems used to explore the role of these fascinating regulators of brain function.

Co-Leaders: Payal Ray PhD, NICHD; and Amar Kar PhD, NIMH

Date/Time/Location: Mondays (July 1st, 8th, 15th, 22nd, 29th); 3:00- 4:00 pm; Building 6B Room 420 (6B429)

Directions: From Building 6 main lobby take elevators to 3rd floor. As you come out of the elevator, make a left, go through the door and keep following the corridor all the way (you will make two more left turns) till you come to the stairwell exit on your right. Take the stairs up one floor. Rm6B429 is on the left.

Reprogramming To Pluripotency

Description: In the early vertebrate embryo, pluripotent cells form the inner cell mass at the blastocyst stage. These pluripotent cells develop into each of the three germ layers further differentiating into tissues and cells of the adult body, or can be used to derive embryonic stem cell (ESC) lines. The ability to revert the cell fate from a differentiated state to pluripotency was not entirely new, because classic studies in nuclear transfer showed that a female germ cell, the oocyte, is also capable of reprogramming. What is, however, a milestone to the field of developmental biology is the finding that only a defined number of factors are needed for reprogramming to pluripotency. In this journal club we want to discuss the mechanisms providing embryo and ESC pluripotency and reprogramming differentiated cells towards pluripotency. We will also address basic concepts of developmental biology related to the oocyte, the early embryo and embryonic stem cells. Journal club participants will be involved in informal discussions with the main goal to understand the major concept of experimental approaches and scientific findings.

Co- Leaders: Edgar-John Vogt PhD, NIDDK; and Ivan Krivega PhD, NIDDK

Dates/Time/Location: Wednesdays (June 26th, July 3rd, 10th, 17th), 10 -11am; Building 50, Room 3229 (Library)

Directions: Take the elevator to the 3rd Floor, turn around the right corner and Room 3229 is the first room on the right.

Reversing The Arrow Of Development And Induced Pluripotent Stem Cell Generation

Description: Developmental transitions were generally considered to be irreversible. The recent development of induced pluripotent stem cell technology demonstrated that every choice is reversible creates great potential for new therapies. The goal of our journal club is to first discuss the fundamentals of development, and to understand the experimental conditions that perturb maturation and undermine lineage commitment. We will cover the 2006 Cell report by Takahashi and Yamanaka that reported the identity of the "Yamanaka factors" that allow for the creation of iPS cells. From this point we will open the course to suggestions for future discussion which could include: the barriers to reprogramming, regenerative tissue therapies, and/or the challenges involved with stem cell therapies.

Co-leaders: Daniel Northrup, NHLBI; Brian Busser, NHLBI

Dates/Time/Location: Tuesdays (June 25th, July 2nd, 9th, 16th, 23rd, and 30th); 12:30-1:30 pm; Building 10, Room B1/C108

Science in the News: Actual Data vs Media's Perspective

Description: Real science or media hype? Students will get to choose from a variety of scientific journal articles in which the findings have caught media attention and hit the newsstands. We will discuss the actual data in the primary scientific journal articles and compare how it was described by the media. What is the actual data? How true is the journalists' description to the real data? Through these discussions, students will learn how to critically read scientific literature and be exposed to research from some of the world's top scientists.

Co-leaders: Bernice Lo PhD, NIAID; Sonia Majri, NIAID

Dates/Time/Location: Tuesdays (June 25th, July 2nd, 9th, 16th, 23rd, and 30th); 5:30-6:30 pm, Building 10, Room 11N230.

Directions: In building 10, take the main elevators up to the 11th floor. Room 11N230 will be at the corner of the N corridor and C corridor, right next to the main elevators.

SHADY GROVE: Cancer Epidemiology: Etiology, Prevention, and Policy

Description: Topics and primary research articles selected for the journal club sessions will draw from recent newsworthy epidemiologic findings. Participants will learn to critically analyze key methods used in the primary research article while concurrently evaluating the press piece that describes the epidemiologic findings. In addition to enhancing critical analytic skills, participants will be encouraged to become more informed consumers of health information by understanding the media's influence on our perception of health and the impact on health policy.

Co-leaders: Sarah Daugherty, PhD, MPH, NCI; Lauren Houghton, PhD, M.Sc., NCI; Clara Bodelon, PhD, MS, NCI

Date/Time/Location: Tuesday (July 9th, 16th, 23rd, 30th); 2:30 - 3:30 pm; National Cancer Institute Shady Grove Campus, Room 7E034

The Dark Art Of Cellular Alchemy: Leprosy, Viruses, And Stem Cell Reprogramming

Description: Humans turning into gods, gods turning into animals; women turning into snakes and statues turning into women: physical and supernatural boundaries are fluid in Ovid's collection of Greek myths, *The Metamorphoses*. But why should classicists have all the fun? Since the 1950s, biologists have known that cells have shape-shifting abilities of their own, and in 2006 a reliable method to change cells from one form to another was developed. Now, mediated through a transition state called induced

pluripotent stem cells, anyone with the right mix of transcription factors and cell culture media can turn skin into blood, blood into bone, and bone into just about anything else. Such “reprogramming” is not just a fancy new technology, though (admittedly one with billion dollar biomedical implications). Recent research has uncovered a surprising role of stem cell alchemy in the interaction between some disease organisms and us, their hosts. In this journal club, we will first briefly review some of the foundational studies that have opened the window to every cell’s metamorphic potential. We will then study in depth a paper about how leprosy bacteria slip in through this window under cover of dark, effectively turning the cells they infect into not-totally-human cell types that can more thoroughly spread the disease. Lastly, we will examine research showing that mammalian cells – in a slick move of evolutionary jujitsu – use the scars of viral infection to regulate the formation and differentiation of stem cells during normal development. Todd MacFarlan, PhD, the lead author of this paper and now an investigator at the NICHD, will be coming in to help us discuss his work. Students in this journal club will not just be exposed to one area of cutting edge biology (the kind that won’t make it to textbooks for at least a decade). They will also practice breaking complex research papers into manageable narrative parts, an essential technique for quickly understanding the essence and implications of any new scientific finding. The papers we work on will be difficult even for people with a strong background in stem cell biology, and understanding them will require focused reading and active discussion. However, the satisfaction of de-puzzling dense research – one baby step towards de-puzzling nature itself – will be fun and well worth the effort.

Co-leaders: Joe Carver, NCI; Amy Ton, NICHD; and Todd MacFarlan PhD, NICHD

Date/Time/Location: Fridays (June 28th, July 5th, 12th, 19th, 26th, and August 2nd); 2-3 pm; Building 10, Room 5-2550,.

Directions: Take the elevators from the Clinical Center atrium in Building 10 (where Au Bon Pain cafe is) to the fifth floor. From here, cross the atrium going towards the front of the Clinical Center; room 2550 will be on the left.

The Future Of Personalized Medicine: Using Genomics In Cancer Profiling

Description: Genomics, the field that attempts to understand the genetic information contained in whole genomes has been making big headlines in the news. With major advancements in sequencing technology it is now possible to sequence whole genomes rapidly and relatively cheaply. Scientists are now using genomics to profile all the DNA mutations in the genomes of common cancers. This has the potential to create better classifications for tumors and personalized treatments for cancer patients. This journal club will examine research papers from studies that used genomics to study different cancers. We will discuss the genomics methods used, evaluate the validity of the conclusions, and the potential benefits to patients.

Co-leaders: Jacqueline Goeres, Ph.D. and Aimee Jaramillo-Lambert, Ph.D.

Date/Time/Location: Tuesdays (June 25th, July 9th, 23rd, and 30th); 1-3pm; Building 8 Room 122.

Directions: Building 8 is across the street from Building 50. If you go through the main doors (doors on the side that faces Bldg 5 and down the stairs) the room is the first door to the right.

The Neurobiology of PTSD: Preclinical and Clinical Evidence

Description: This journal club will explore preclinical and clinical research on the role of the amygdala and related circuitry in post-traumatic stress disorder (PTSD). Each week we will review amygdala involvement at a distinct level of analysis, including anatomy, physiology, and behavior in multiple species (rodents, non-human primates, and humans). The goal of this journal club will be to promote understanding of the neurobiology of PTSD and examine how preclinical research in animals can translate into specific treatments for patients. Members will also learn how to read and evaluate scientific articles and will be expected to present one article to the group.

Co-leaders: Anna Radke, PhD, NIAAA; Courtney Pinard, PhD, NIAAA

Dates/Time/Location: Monday (June 24th, July 1st, 8th, 15th, 22nd, and Thursday August 1st); 3-4 pm; Natcher (Building 45), Room H

Them and Us: The Role of the Gut Microbiome in Human Health and Disease

Description: Humans live together with a very complex community of microorganisms, a majority of which reside in the gut. These organisms have long been known to play a role in digestion, immune system development, and protection against pathogens. In recent years through the advancement of sequencing techniques, we have begun to recognize that these microorganisms play a much larger role in human health and disease than previously thought. There is now evidence that the gut microbiome may influence a number of diseases including colon cancer, diabetes, autoimmune disease, atherosclerosis, and autism. In this journal club, we will discuss recent papers that address the complex relationship between humans and our gut microbiome. We will focus on the role of the gut microbiome in various human diseases, as well as covering more general aspects of this relationship, including the influence of diet on the composition of the microbiome.

Co-leaders: Marlena Wilson PhD, NIDDK; Jessica Pierce, PhD, NIDDK

Dates/Time/Location: Tuesdays (June 25th, July 2nd, 9th, 17th (Wednesday), and 30th); 2-3 pm; Building 5, Room 127.

Transcription: Master Regulator Of Gene Expression

Description: The genome of an organism contains the complete genetic information that is passed on from generation to generation. All cells in a given organism contain the same genetic material, and the same set of genes. However, different combinations of

genes are expressed during growth, development and in response to the environmental stimuli. Regulation of gene expression is key for every aspect of cellular function. Alterations in gene expression can lead to many different diseases including cancer, autoimmunity and neurological disorders, diabetes and cardiovascular diseases, among many others. When an eukaryotic cell decides to express a specific protein, its gene is copied into a messenger RNA (mRNA) in the nucleus through a process called "Transcription". Then the mRNA is transported from the nucleus to the cytoplasm where the final protein is produced by the ribosome. In eukaryotes, transcription of protein coding genes is mediated by a molecular machine called RNA Polymerase II (RNA Pol II), which works synchronously with a battery of other proteins and protein complexes to synthesize mRNA. Transcription can be divided in three consecutive phases based upon the position of the RNA Pol II within the coding sequence: initiation, elongation and termination. Each of these phases are highly regulated making transcription the key step in gene expression. During this seminar series we will be exploring each of the three stages of transcription and their regulation and how alterations of some of these processes may result in a number of diseases relevant to human health.

Co-leaders: Soledad Ivaldi, PhD, NIDDK; Jennifer Plank, PhD, NIDDK

Dates/Time/Location: Mondays (June 24th, July 1st, 8th, 15th); 12:00 - 1:00 pm; Building 50, Room 3229

Vaccines: Why You Have No Clue What Diphtheria Is

Description: Since Edward Jenner first used cowpox as an inoculum against smallpox at the end of the 18th century, vaccines have had an incredible impact on human health and have saved millions of lives. There are currently dozens of successful vaccines available, but in spite of the best efforts of scientists around the world, we still lack safe and effective vaccines to both old and new pathogens, and existing vaccines do not always provide robust and durable immunity. New technologies and scientific advances have greatly informed our understanding of the immune system and our ability to design better vaccines. This journal club will focus on the ongoing development of vaccines for major global pathogens including HIV, malaria, and influenza. We will read a mixture of basic scientific papers and clinical studies to investigate vaccine development in the 21st century.

Co-leaders: Eva Archer, VRC/NIAID; Andrew Ishizuka, VRC/NIAID

Dates/Times/Location: Tuesdays (June 25th, July 2nd, 9th, 16th, 23rd, and 30th); 5:30 – 6:30 pm; Building 40 (Vaccine Research Center), First Floor, Conference Room 1207